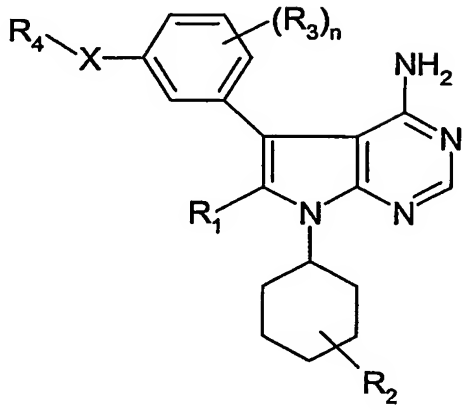
Claims:

1. A compound of formula I



(I),

wherein

n is from 0 to 4,

R_1 is hydrogen, unsubstituted or substituted lower alkyl or halogen,

R_2 is hydroxy; unsubstituted, mono- or disubstituted amino; a heterocyclic radical containing at least one nitrogen ring atom and being attached to the cyclohexane ring of the molecule of formula I via a nitrogen ring atom; a radical R_5-(C=Y)-NH-, wherein R_5 is unsubstituted or substituted lower alkyl, unsubstituted, mono- or disubstituted amino, a heterocyclic radical, or etherified hydroxy, and Y is oxygen, sulfur or imino; or a radical R_6-sulfonylamino, wherein R_6 is unsubstituted or substituted lower alkyl, unsubstituted, mono- or disubstituted amino or phenyl optionally substituted by lower alkyl, lower alkoxy or nitro,

R_3 is lower alkyl, hydroxy-, amino- or halogen-substituted lower alkyl, hydroxy, cyano, lower alkoxy, lower alkanoyl, lower alkanoyloxy, amino, mono- or di-lower alkylamino, lower alkanoylamino, carboxy, lower alkoxycarbonyl or halogen, wherein the R_3 substituents can be selected independently of one another if n>1,

R_4 is a radical R_7-$CR_8(R_9)$-, wherein R_7 is cyclobutyl, cyclopentyl, cyclohexyl, phenyl, furyl, pyrrolyl, thienyl or pyridyl, said R_7 substitutents being optionally substituted by one or more radicals selected from lower alkyl and halogen, and R_8 and R_9 are independently of each other hydrogen, lower alkyl or halogen, and

X is selected from -O-, -NH- and -S-,

or a salt thereof.

2. A compound of formula I according to claim 1, wherein
n is from 0 to 4,
R_1 is hydrogen, unsubstituted or substituted lower alkyl or halogen,
R_2 is hydroxy; unsubstituted, mono- or disubstituted amino; a heterocyclic radical containing at least one nitrogen ring atom and being attached to the cyclohexane ring of the molecule of formula I via a nitrogen ring atom; a radical R_5-(C=Y)-NH-, wherein R_5 is unsubstituted or substituted lower alkyl, unsubstituted, mono- or disubstituted amino, a heterocyclic radical, or etherified hydroxy, and Y is oxygen, sulfur or imino; or a radical R_6-sulfonylamino, wherein R_6 is unsubstituted or substituted lower alkyl, unsubstituted, mono- or disubstituted amino or phenyl optionally substituted by lower alkyl, lower alkoxy or nitro,
R_3 is lower alkyl or lower alkoxy, wherein the R_3 substituents can be selected independently of one another if n>1,
R_4 is a radical R_7-$CR_8(R_9)$-, wherein R_7 is cyclobutyl, cyclopentyl, cyclohexyl, phenyl, furyl, pyrrolyl, thienyl, pyridyl or phenyl substituted by one or more radicals selected from lower alkyl and halogen, and R_8 and R_9 are independently of each other hydrogen, lower alkyl or halogen, and
X is selected from -O-, -NH- and -S-,
or a salt thereof.

3. A compound of formula I according to claim 1, wherein
n is 0,
R_1 is hydrogen, unsubstituted or substituted lower alkyl or halogen,
R_2 is hydroxy; unsubstituted, mono- or disubstituted amino; a heterocyclic radical containing at least one nitrogen ring atom and being attached to the cyclohexane ring of the molecule of formula I via a nitrogen ring atom; a radical R_5-(C=Y)-NH-, wherein R_5 is unsubstituted or substituted lower alkyl, unsubstituted, mono- or disubstituted amino, a heterocyclic radical, or etherified hydroxy, and Y is oxygen, sulfur or imino; or a radical R_6-sulfonylamino, wherein R_6 is unsubstituted or substituted lower alkyl, unsubstituted, mono- or disubstituted amino or phenyl optionally substituted by lower alkyl, lower alkoxy or nitro,
R_4 is benzyl, and
X is selected from -O-, -NH- and -S-,
or a salt thereof.

4. A compound of formula I according to claim 1, wherein
n is 0,
R_1 is hydrogen, unsubstituted or substituted lower alkyl or halogen,
R_2 is hydroxy; unsubstituted, mono- or disubstituted amino; a heterocyclic radical having from 4 to 8 ring members and from 1 to 3 heteroatoms whereby at least one heteroatom is nitrogen and the binding of the heterocyclic radical to the cyclohexane ring of the molecule of formula I occurs via a nitrogen ring atom; a radical R_5-(C=Y)-NH-, wherein R_5 is lower alkyl, unsubstituted, mono- or disubstituted amino, etherified hydroxy, a heterocyclic radical having from 4 to 8 ring members and from 1 to 3 heteroatoms whereby at least one heteroatom is nitrogen and the binding of the heterocyclic radical occurs via a nitrogen ring atom, lower alkyl substituted by said heterocyclic radical or by one or more radicals selected independently of one another from the group consisting of amino, N-lower alkylamino, N,N-di-lower alkylamino, N-lower alkanoylamino, N,N-di-lower alkanoylamino, hydroxy, lower alkoxy, lower alkoxy-lower alkoxy, lower alkanoyl, lower alkanoyloxy, cyano, nitro, carboxy, lower alkoxycarbonyl, carbamoyl, amidino, guanidino, ureido, mercapto, lower alkylthio and halogen, and Y is oxygen, sulfur or imino; or a radical R_6-sulfonylamino, wherein R_6 is unsubstituted or substituted lower alkyl, unsubstituted, mono- or disubstituted amino or phenyl optionally substituted by lower alkyl, lower alkoxy or nitro,
R_4 is benzyl, and
X is selected from -O-, -NH- and -S-,
or a salt thereof.

5. A compound of formula I according to claim 1, wherein
n is 0,
R_1 is hydrogen, lower alkyl or halogen,
R_2 is hydroxy; unsubstituted, mono- or disubstituted amino; a heterocyclic radical having from 4 to 8 ring members and from 1 to 3 heteroatoms whereby at least one heteroatom is nitrogen and the binding of the heterocyclic radical to the cyclohexane ring of the molecule of formula I occurs via a nitrogen ring atom; a radical R_5-(C=Y)-NH-, wherein R_5 is lower alkyl, unsubstituted or monosubstituted amino, etherified hydroxy, or lower alkyl substituted by a heterocyclic radical having from 4 to 8 ring members and from 1 to 3 heteroatoms whereby at least one heteroatom is nitrogen and the binding of the heterocyclic radical occurs via a nitrogen ring atom, and Y is oxygen or imino; or a radical R_6-sulfonylamino, wherein R_6 is lower alkyl or disubstituted amino,

R_4 is benzyl, and
X is selected from -O-, -NH- and -S-,
or a salt thereof.

6. A compound of formula I according to claim 1, wherein
n is 0,
R_1 is hydrogen, lower alkyl or halogen,
R_2 is hydroxy, amino, N,N-di-lower alkylamino, pyrimidinyl-amino, 1,4,5,6-tetrahydro-pyrimidinyl-amino, 4,5-dihydro-1H-imidazolyl-amino, azetidin-1-yl, pyrrolidin-1-yl, 1-piperidyl, lower alkyl-piperazin-1-yl, morpholin-4-yl, thiomorpholin-4-yl; a radical R_5-(C=Y)-NH-, wherein R_5 is lower alkyl, lower alkoxy, amino, N-lower alkylamino, N-(phenyl-lower alkyl)-amino, N-(lower alkyl-phenyl-lower alkyl)-amino, N-(lower alkoxy-phenyl-lower alkyl)-amino, N-(morpholin-4-yl-lower alkyl)-amino, N-(N',N'-di-lower alkylamino-lower alkyl)-amino, lower alkoxy-lower alkoxy, 1-piperidyl-lower alkyl, morpholin-4-yl-lower alkyl or lower alkyl-piperazin-1-yl-lower alkyl, and Y is oxygen or imino; or a radical R_6-sulfonylamino, wherein R_6 is lower alkyl or N,N-di-lower alkylamino,
R_4 is benzyl, and
X is -O-,
or a salt thereof.

7. A compound of formula I according to claim 1, selected from the group consisting of
cis-4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexanol;
trans-4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexanol;
cis-5-(3-benzyloxy-phenyl)-7-(4-piperidin-1-yl-cyclohexyl)-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
trans-5-(3-benzyloxy-phenyl)-7-(4-piperidin-1-yl-cyclohexyl)-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
cis-5-(3-benzyloxy-phenyl)-7-(4-pyrrolidin-1-yl-cyclohexyl)-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
trans-5-(3-benzyloxy-phenyl)-7-(4-pyrrolidin-1-yl-cyclohexyl)-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
cis-5-(3-benzyloxy-phenyl)-7-[4-(4-methyl-piperazin-1-yl)-cyclohexyl]-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;

trans-5-(3-benzyloxy-phenyl)-7-[4-(4-methyl-piperazin-1-yl)-cyclohexyl]-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
cis-5-(3-benzyloxy-phenyl)-7-(4-morpholin-4-yl-cyclohexyl)-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
trans-5-(3-benzyloxy-phenyl)-7-(4-morpholin-4-yl-cyclohexyl)-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
cis-7-(4-azetidin-1-yl-cyclohexyl)-5-(3-benzyloxy-phenyl)-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
trans-7-(4-azetidin-1-yl-cyclohexyl)-5-(3-benzyloxy-phenyl)-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
cis-5-(3-benzyloxy-phenyl)-7-(4-thiomorpholin-4-yl-cyclohexyl)-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
trans-5-(3-benzyloxy-phenyl)-7-(4-thiomorpholin-4-yl-cyclohexyl)-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
trans-5-(3-benzyloxy-phenyl)-7-(4-diethylamino-cyclohexyl)-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
cis-7-(4-amino-cyclohexyl)-5-(3-benzyloxy-phenyl)-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
trans-7-(4-amino-cyclohexyl)-5-(3-benzyloxy-phenyl)-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
cis-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-carbamic acid methyl ester;
cis-1-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-3-methyl-urea;
cis-N-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-2-piperidin-1-yl-acetamide;
cis-N-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-2-morpholin-4-yl-acetamide;
cis-N-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-2-(4-methyl-piperazin-1-yl)-acetamide;
cis-5-(3-benzyloxy-phenyl)-7-[4-(pyrimidin-2-ylamino)-cyclohexyl]-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
cis-5-(3-benzyloxy-phenyl)-7-[4-(1,4,5,6-tetrahydro-pyrimidin-2-ylamino)-cyclohexyl]-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
cis-5-(3-benzyloxy-phenyl)-7-[4-(4,5-dihydro-1H-imidazol-2-ylamino)-cyclohexyl]-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;

cis-N-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-methanesulfonamide;
cis-N-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-N,N-dimethylaminosulfonamide;
cis-5-(3-benzyloxy-phenyl)-7-(4-dimethylamino-cyclohexyl)-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
N-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-acetamide;
cis-1-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-3-ethyl-urea;
cis-1-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-3-isopropyl-urea;
cis-1-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-3-propyl-urea;
cis-1-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-3-butyl-urea;
cis-1-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-3-(3-methyl-benzyl)-urea;
cis-1-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-3-benzyl-urea;
cis-1-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-3-(4-methoxy-benzyl)-urea;
cis-1-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-3-tert-butyl-urea;
cis- N-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-guanidine;
cis-1-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-3-(2-dimethylamino-ethyl)-urea;
cis-1-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-3-(2-morpholin-4-yl-ethyl)-urea;
cis-1-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-3-(3-morpholin-4-yl-propyl)-urea;
cis-{4-[4-amino-5-(3-benzyloxy-phenyl)-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexyl}-carbamic acid 2-methoxy-ethyl ester;
cis-4-[4-amino-5-(3-benzyloxy-phenyl)-6-bromo-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexanol;
trans-4-[4-amino-5-(3-benzyloxy-phenyl)-6-bromo-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexanol;

cis-4-[4-amino-5-(3-benzyloxy-phenyl)-6-methyl-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexanol;
trans-4-[4-amino-5-(3-benzyloxy-phenyl)-6-methyl-pyrrolo[2,3-d]pyrimidin-7-yl]-cyclohexanol;
trans-5-(3-benzyloxy-phenyl)-6-methyl-7-[4-(4-methyl-piperazin-1-yl)-cyclohexyl]-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
trans-5-(3-benzyloxy-phenyl)-7-(4-dimethylamino-cyclohexyl)-6-methyl-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
trans-5-(3-benzyloxy-phenyl)-7-(4-diethylamino-cyclohexyl)-6-methyl-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
trans-5-(3-benzyloxy-phenyl)-6-methyl-7-(4-pyrrolidin-1-yl-cyclohexyl)-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
trans-5-(3-benzyloxy-phenyl)-6-methyl-7-(4-morpholin-4-yl-cyclohexyl)-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
trans-7-(4-azetidin-1-yl-cyclohexyl)-5-(3-benzyloxy-phenyl)-6-methyl-7H-pyrrolo[2,3-d]pyrimidin-4-ylamine;
and pharmaceutically acceptable salts thereof.

8. A compound of formula I, or a pharmaceutically acceptable salt thereof, according to any one of claims 1 to 7 for use in a method for the treatment of the human or animal body.

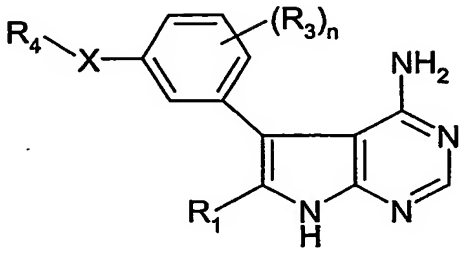
9. A pharmaceutical composition comprising a compound of formula I or a pharmaceutically acceptable salt thereof according to any one of claims 1 to 7, together with at least one pharmaceutically acceptable carrier.

10. Use of a compound of formula I according to any one of claims 1 to 7, or a pharmaceutically acceptable salt thereof, for the preparation of a pharmaceutical composition for the treatment of a disease which responds to an inhibition of the IGF-IR-dependent cell proliferation.

11. Use of a compound of formula I according to any one of claims 1 to 7, or a pharmaceutically acceptable salt thereof, for the preparation of a pharmaceutical composition for the treatment of a disease which responds to an inhibition of the IGF-IR tyrosine kinase.

12. A process for the preparation of a compound of formula I according to claim 1 or of a salt of such a compound, characterized in that

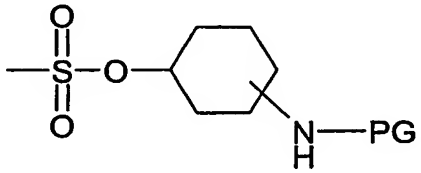
a) in order to prepare a compound of formula I, in which R_2 is hydroxy, a compound of formula II



(II),

wherein n, R_1, R_3, R_4 and X have the meanings as defined for a compound of formula I, is reacted with methanesulfonic acid hydroxy-cyclohexyl ester;

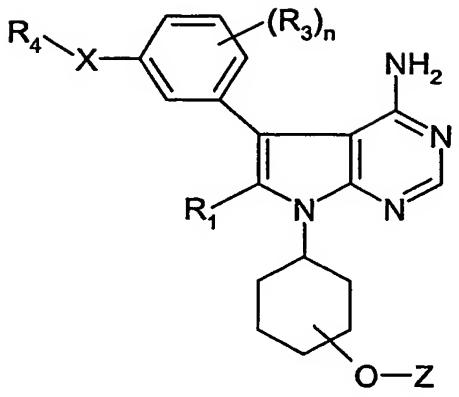
b) in order to prepare a compound of formula I, in which R_2 is amino, a compound of formula II, wherein n, R_1, R_3, R_4 and X have the meanings as defined for a compound of formula I, is reacted in a first step with a compound of formula III



(III),

wherein PG is an amino protecting group which is removed in a second step;

c) in order to prepare a compound of formula I, in which R_2 is mono- or disubstituted amino or a heterocyclic radical containing at least one nitrogen ring atom and being attached to the cyclohexane ring of the molecule of formula I via a nitrogen ring atom, a compound of formula IV,

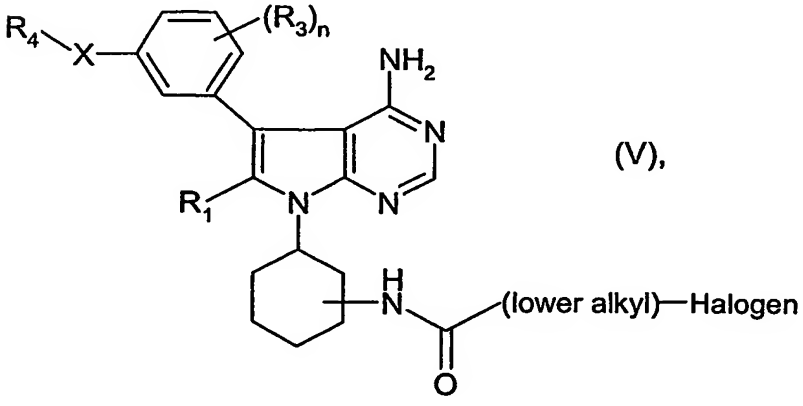


(IV),

wherein n, R_1, R_3, R_4 and X have the meanings as defined for a compound of formula I and -O-Z is a leaving group, is reacted with a compound of the formula R_{10}-H in which R_{10} is mono- or disubstituted amino or a heterocyclic radical containing at least one nitrogen ring atom wherein the heterocyclic radical is attached to the hydrogen atom of R_{10}-H via a nitrogen ring atom;

d) in order to prepare a compound of formula I, in which R_2 is a radical R_5-(C=Y)-NH- wherein R_5 is unsubstituted or substituted lower alkyl and Y is oxygen, a compound of formula I, in which R_2 is amino, is reacted with a compound of the formula R_5-(C=O)-Halogen wherein R_5 is unsubstituted or substituted lower alkyl;

e) in order to prepare a compound of formula I, in which R_2 is a radical R_5-(C=Y)-NH- wherein R_5 is lower alkyl substituted by a heterocyclic radical containing at least one nitrogen ring atom whereby the binding of the heterocyclic radical to lower alkyl occurs via a nitrogen ring atom, and Y is oxygen, a compound of formula V



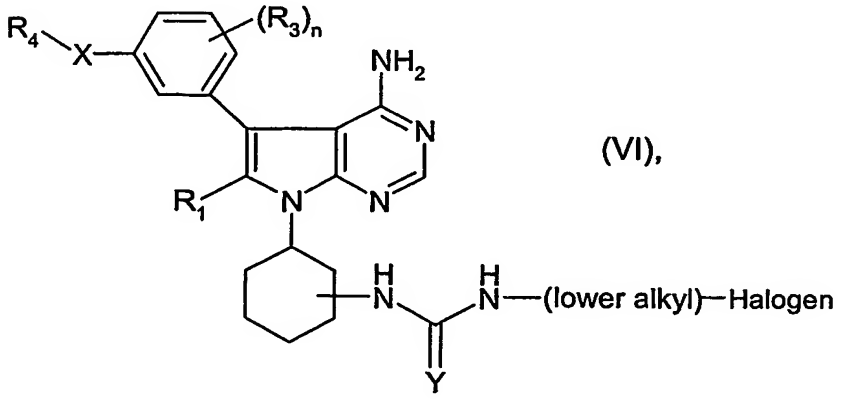
(V),

wherein n, R_1, R_3, R_4 and X have the meanings as defined for a compound of formula I, is reacted with a compound of the formula R_{11}-H in which R_{11} is a heterocyclic radical containing at least one nitrogen ring atom wherein the heterocyclic radical is attached to the hydrogen atom of R_{11}-H via a nitrogen ring atom;

f) in order to prepare a compound of formula I, in which R_2 is a radical R_5-(C=Y)-NH- wherein R_5 is unsubstituted, mono- or disubstituted amino or a heterocyclic radical containing at least one nitrogen ring atom whereby the binding of the heterocyclic radical occurs via a nitrogen ring atom and Y is oxygen, a compound of formula I, in which R_2 is a radical R_5-(C=Y)-NH- wherein R_5 is imidazol-1-yl and Y is oxygen, is reacted with a compound of the formula R_5-H, in which R_5 is unsubstituted, mono- or disubstituted amino, or a heterocyclic radical which contains at least one nitrogen ring atom;

g) in order to prepare a compound of formula I, in which R_2 is a radical R_5-(C=Y)-NH- wherein R_5 is unsubstituted or monosubstituted amino and Y is oxygen or sulfur, a compound of formula I, in which R_2 is amino, is reacted with a compound of the formula R_{12}-N=C=Y wherein Y is oxygen or sulfur, the radical R_{12}-NH- corresponding to unsubstituted or monosubstituted amino R_5;

h) in order to prepare a compound of formula I, in which R_2 is a radical R_5-(C=Y)-NH- wherein R_5 is lower alkylamino wherein the lower alkyl moiety is substituted by unsubstituted, mono- or disubstituted amino or by a heterocyclic radical containing at least one nitrogen ring atom whereby the binding of the heterocyclic radical to the lower alkyl moiety occurs via a nitrogen ring atom and Y is oxygen or sulfur, a compound of formula VI

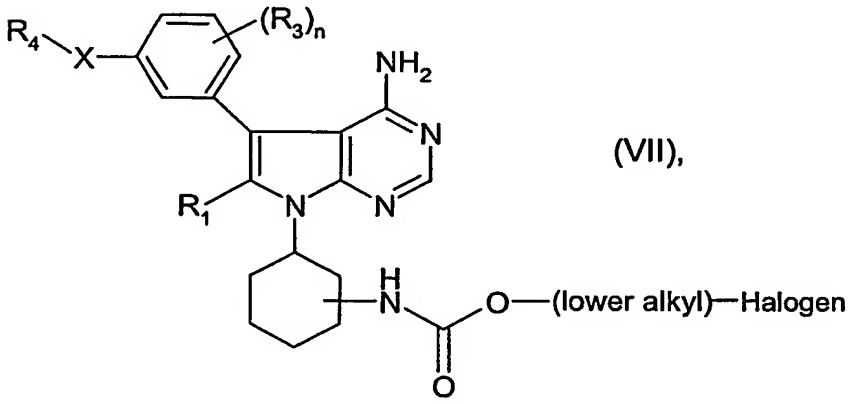


(VI),

wherein Y is oxygen or sulfur and n, R_1, R_3, R_4 and X have the meanings as defined for a compound of formula I, is reacted with a compound of the formula R_{13}-H, in which R_{13} is unsubstituted, mono- or disubstituted amino or a heterocyclic radical containing at least one nitrogen ring atom wherein the heterocyclic radical is attached to the hydrogen atom of R_{13}-H via a nitrogen ring atom;

i) in order to prepare a compound of formula I, in which R_2 is a radical R_5-(C=Y)-NH- wherein R_5 is etherified hydroxy and Y is oxygen, a compound of formula I, in which R_2 is amino, is reacted with a compound of the formula R_5-(C=O)-Halogen wherein R_5 is etherified hydroxy;

j) in order to prepare a compound of formula I, in which R_2 is a radical R_5-(C=Y)-NH- wherein R_5 is lower alkoxy substituted by unsubstituted, mono- or disubstituted amino or by a heterocyclic radical containing at least one nitrogen ring atom whereby the binding of the heterocyclic radical to the lower alkyl moiety of lower alkoxy occurs via a nitrogen ring atom and Y is oxygen, a compound of formula VII



(VII),

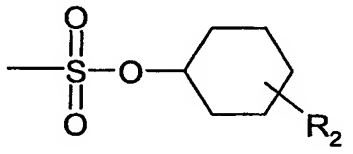
wherein n, R_1, R_3, R_4 and X have the meanings as defined for a compound of formula I, is reacted with a compound of the formula R_{14}-H, in which R_{14} is unsubstituted, mono- or disubstituted amino or a heterocyclic radical containing at least one nitrogen ring atom wherein the heterocyclic radical is attached to the hydrogen atom of R_{14}-H via a nitrogen ring atom;

k) in order to prepare a compound of formula I, in which R_2 is a radical R_6-sulfonylamino wherein R_6 has the meanings as defined above under formula I, a compound of formula I, in which R_2 is amino, is reacted with R_6-sulfonyl halide;

l) in order to prepare a compound of formula I, in which R_1 is halogen, a compound of formula I, in which R_1 is hydrogen, is reacted with N-halosuccinimide;

m) in order to prepare a compound of formula I, in which R_1 is lower alkyl, a compound of formula I, in which R_1 is halogen, is reacted with tetra(lower alkyl) tin;

n) in order to prepare a compound of formula I, a compound of formula II, wherein n, R_1, R_3, R_4 and X have the meanings as defined for a compound of formula I, is reacted with a compound of formula VIII



(VIII),

wherein R_2 has the meanings as defined for a compound of formula I;

wherein functional groups which are present in the starting compounds of processes a) to n) and are not intended to take part in the reaction, are present in protected form if necessary, and protecting groups that are present are cleaved, wherein said starting compounds may also exist in the form of salts provided that a salt-forming group is present and a reaction in salt form is possible,

and, if so desired, a compound of formula I thus obtained is converted into another compound of formula I, a free compound of formula I is converted into a salt, an obtained salt of a compound of formula I is converted into the free compound or another salt, and/or a mixture of isomeric compounds of formula I is separated into the individual isomers.